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Bryan W. Bockhop
ARNALL GOLDEN GREGORY LLP
1201 WEST PEACHTREE STREET
ATLANTA, GA 30309-3450

EXAMINER	
CHUNG, DANIEL J	
ART UNIT	**PAPER NUMBER**
2672	24

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/353,887	EDWARDS, STEPHEN W.
	Examiner	**Art Unit**
	Daniel J Chung	2672

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-22 and 24-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-22 and 24-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claims 1,4-22, and 24-38 are presented for examination. This office action is in response to the amendment filed on 6-26-2003.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1,4-13,15-19,21-22,24-25 and 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lentz (5,886,705) in view of Young et al (U.S 5,831,637) and Tanaka et al (5,793,371), and further in view of Saunders et al (6,046,747).

Regarding claim 1, Lentz discloses that the claimed feature of a graphics accelerator for processing a graphical image, the graphics accelerator comprising: a single texture buffer (21) for storing texture maps (i.e. "texel") and data relating to the texture maps stored in the texture buffer (21) (See Abstract line 1-2, col 2 line 18-20, col 3 line 24-30, col 8 line 15-31); a plurality of texture processors (13 & 24) that perform texturing operations on the graphical image, the plurality of the texture processors retrieving texture packets from the single texture buffer (See Abstract, Fig 1, Fig 2, col 1 line 5-13); each texture processor (13 & 24) including a fetching engine ["pixel-value

calculation";15] (See col 2 line 1-2) that retrieves texture packets, each texture packet being stored in the texture buffer (21) and being associated with a texture map that is different than the texture maps associated with any other texture packet in the texture buffer, each texture packet including data ["texture-memory addresses", which identified by texture address; 24) relating to the location of its associated texture map ["texel"] in the texture buffer (21) and data relating to the dimensional type of that texture packet's associated texture map. (See Fig 1, Fig 7, col 1 line 66-col 2 line 4, col 2 line 43-60, col 3 line 10-14, col 3 line 22-36, col 4 line 14-17, col 4 line 42-54, col 5 line 7-11, col 5 line 22-23, col 8 line 46+)

Lentz does not specifically disclose "the texture buffer", as claimed by Applicant. However, a texture buffer is an obvious embodiment of the notoriously well-known texture memory. According to the on-line computer dictionary, buffer is defined as "a region of memory reserved for use as an intermediate repository in which data is temporarily held while waiting to be transferred between two locations, as between an application's data area and an input/output device". From its definition of "buffer", it is reasonable to interpret the texture buffer as a part/same of texture memory. Therefore, it would have been obvious to one skilled in the art to "texture buffer" into the teaching of Lentz.

Also, Lentz does not explicitly discloses that performing texture operations by multiple texture processors, wherein the plurality of processors retrieve texture packets

from the single texture buffer. However, such limitations are shown in the teaching of Young et al. ['employing multiple texture processors (251-254) and doing texture mapping with multiple texture processor (251-254), which connected with texture memory (251a-254a)] (See Fig 1, Fig 2 of Young et al) The motivation would have been to minimize the time required for texture processing. Further, as to the computer dictionary, Multiprocessing/Multiprocessor is defined as "mode of operation in which two or more connected and roughly equal processing units each carry out one or more processes. In multiprocessing, each processing unit works on a different set of instructions or on different parts of the same process. The objective is increased speed or computing power, the same as in parallel processing and in the use of special units called coprocessors". Therefore, it would have been obvious to one skilled in the art to employ plurality of texture processors [i.e. multiple circuitry of 13 in Fin 1 or Lentz], thereby reducing texture-processing time effectively. (See suggestions in col 7 line 25-34 of Lentz; Also See "coprocessors" in Tanaka) Although, one single texture memory, as recited in presented claims, is not illustrated from the Figure 2,3 of Young et al (rather separated texture memory are connected with each processors), it would have been obvious to one skilled in the art to perform the plurality of processors by retrieving data from the single texture buffer (i.e. combining texture memory (251a-254a) of young et al into a single texture memory), in order to reduce required processing time in parallel processing structure. (See Fig 4, col 3 line 31-39, col 3 line 51-54 in 'background of the invention' of Kobayashi et al (U.S 5,761,401)) ["to enable all parallel

processing units to access a single texture buffer because texture mapping is applying by the parallel processing units"]

Also, Lentz does not explicitly disclose that a texture packets identifying the location of a texture map. (although, Lentz somewhat teaches that "the texture packet including data relating to the location of its texture map in the texture buffer". (See col 2 line 1-2, col 2 line 48-56, col 2 lien 57-60, col 4 line 14-16, col 5 line 9-11, col 8 line 28-31)) However, Tanaka et al clearly discloses that the packet data, which represents the storage location of a texture data/map. (See col 2 line 55-62, col 8 line 26-34) The motivation would have been to provide enhanced image data by converting the existing file format [ex. texture data, texture address data] into the new improved format [e.g. texture packet], as mentioned in the teaching of Tanaka et al. (See col 2 line 55-col 3 line 43) Therefore, it would have been obvious to one skilled in the art to incorporate the teaching of Tanaka et al into the teaching of Lentz, thereby effectively retrieving proper texels from texture memory.

Lentz does not specifically disclose that texture packet has data relating to the dimensional type of its texture map. However, in an analogous art (texture mapping), Saunders et al discloses that "the special bind texture call includes a target parameter that defines the dimension of the texture map and an ID number that identifies the display list texture object." (See col 6 line 56-67) It would have been obvious to one skilled in the art to incorporate the teaching of Saunders et al into the teaching of Lentz,

in order to provide efficient way to perform texture mapping process based on dimension type of texture data, as multi-dimensional texture map are used in current computer graphic systems, (also see the suggestions in col 1 line 51 of Lentz "<u>not necessarily two dimensional</u>") it is necessarily required for indicating dimensional type in texture data, because the ordinary skilled in the art would know that different mathematical equations are required for different dimensional type of texture maps, and the three-dimensional texture mapping process will require large capacity processor and much more time to process comparing to one-dimensional texture mapping process, since 3-D texture mapping have more variable to calculate. Therefore, having the texture data, which indicates its dimensional type, is also advantageously desirable in the teaching of Lentz for operating texture mapping process efficiently with easy manner.

Regarding claim 4, Lentz discloses that the dimensional type of each texture map is one of a one-dimensional texture map, a two-dimensional texture map, and a three-dimensional texture map. (See Fig 7)

Regarding claim 5, Lentz discloses that an input for receiving a texture message indicating that a texture map is to be utilized by the texture processor, the fetching engine responsively retrieving selected texture packets from the single texture buffer in response to receipt of the texture message. (See Fig 1)

Regarding claim 6, Lentz discloses that the texture processor [output-image generator; 13] includes a parsing engine [12] for parsing a fetched texture packet and determining information relating to the texture map associated with the fetched texture packet. (See Fig 1; Also See col 2 line 55-62, col 8 line 26-34 in Tanaka et al)

Regarding claim 7, Lentz discloses that the information relates to the location in the texture buffer [21] of the texture map associated with the fetched texture packet. (See Fig 1; Also See col 2 line 55-62, col 8 line 26-34 in Tanaka et al)

Regarding claim 8, Lentz discloses that the information relates to the number of dimensions of the texture map associated with the fetched texture packet. (See Fig 1; Also See col 2 line 57-60 in Saunders et al)

Regarding claim 9, Lentz discloses that the claimed feature of a method of applying texture to a graphical image employing a graphics accelerator with a plurality of texture processors, the method comprising:

Locating a texture packet ["texel" or "texture address data"] identifying the location of a texture map in a single memory device [21], wherein the texture packet is associated with the texture map that is different than texture maps associated with other texture packets; parsing [12,13] the texture packet to determine the location and the number of dimensions of the texture map; retrieving, based upon the determined

location, the texture map from the single memory device [21]; applying the texture map to the graphical image. (See Fig 1, Fig 2, Fig 7, col 1 line 66-col 2 line 4, col 2 line 43-60, col 3 line 10-14, col 3 line 22-36, col 4 line 14-17, col 4 line 42-54, col 5 line 7-11, col 5 line 22-23, col 8 line 46+)

Lentz does not explicitly disclose that a texture packets identifying the location of a texture map. However, Tanaka et al discloses that the packet data, which represents the storage location of a texture data/map. (See col 2 line 55-62, col 8 line 26-34) The motivation would have been to provide enhanced image data by converting the existing file format [ex. texture data, texture address data] into the new improved format [e.g. texture packet], as mentioned in the teaching of Tanaka et al. (See col 2 line 55-col 3 line 43) Therefore, it would have been obvious to one skilled in the art to incorporate the teaching of Tanaka et al into the teaching of Lentz, thereby effectively retrieving proper texels from texture memory.

Lentz does not specifically disclose that texture packet has data relating to the dimensional type of its texture map. However, in an analogous art (texture mapping), Saunders et al discloses that "the special bind texture call includes a target parameter that <u>defines the dimension of the texture map</u> and an ID number that identifies the display list texture object." (See col 6 line 56-67) It would have been obvious to one skilled in the art to incorporate the teaching of Saunders et al into the teaching of Lentz, in order to provide efficient way to perform texture mapping process based on

dimension type of texture data, as multi-dimensional texture map are used in current computer graphic systems, (also see the suggestions in col 1 line 51 of Lentz "not necessarily two dimensional") it is necessarily required for indicating dimensional type in texture data, because the ordinary skilled in the art would know that different mathematical equations are required for different dimensional type of texture maps, and the three-dimensional texture mapping process will require large capacity processor and much more time to process comparing to one-dimensional texture mapping process, since 3-D texture mapping have more variable to calculate. Therefore, having the texture data, which indicates its dimensional type, is also advantageously desirable in the teaching of Lentz for operating texture mapping process efficiently with easy manner.

Regarding claim 10, Lentz discloses that the texture packet is located by accessing a record identifying the location of the texture packet. (See Abstract, Fig 1, Fig 7, col 2 line 48-60, col 4 line 14-17, col 4 line 42-54, col 5 line 7-11, col 8 line 15-31)

Regarding claim 11, Lentz discloses that the single memory device is texture memory. (See Fig 1)

Regarding claim 12, Lentz discloses that the texture packet is stored in the single memory device. (See Fig 1)

Regarding claim 13, Lentz discloses that reconstructing the texture map after it is retrieved from the single memory device. (See Fig 1, Fig 7)

Regarding claims 15-19, claims 15-19 are similar in scope to the claims 9-13, and thus the rejections to claims 9-13 hereinabove are also applicable to claims 15-19.

Regarding claim 21, claim 21 is similar in scope to the claim 1, and thus the rejection to claim 1 hereinabove is also applicable to claim 21.

In addition, Lentz does not specifically disclose that texture packet has data relating to the dimensional type of its texture map. However, in an analogous art (texture mapping), Saunders et al discloses that "the special bind texture call includes a target parameter that defines the dimension of the texture map and an ID number that identifies the display list texture object." (See col 6 line 56-67) It would have been obvious to one skilled in the art to incorporate the teaching of Saunders et al into the teaching of Lentz, in order to provide efficient way to perform texture mapping process based on dimension type of texture data, as multi-dimensional texture map are used in current computer graphic systems, (also see the suggestions in col 1 line 51 of Lentz "not necessarily two dimensional") it is necessarily required for indicating dimensional type in texture data, because the ordinary skilled in the art would know that different mathematical equations are required for different dimensional type of texture maps, and the three-dimensional texture mapping process will require large capacity processor and

much more time to process comparing to one-dimensional texture mapping process, since 3-D texture mapping have more variable to calculate. Therefore, having the texture data, which indicates its dimensional type, is also advantageously desirable in the teaching of Lentz for operating texture mapping process efficiently with easy manner.

Regarding claim 22, claim 22 is similar in scope to the claim 1, and thus the rejections to claim 1 hereinabove is also applicable to claim 22.

Regarding claims 24-25, claims 24-25 are similar in scope to the claims 5-6, and thus the rejections to claims 5-6 hereinabove are also applicable to claims 24-25.

Regarding claim 35, Lentz discloses that the claimed feature of a data structure for storing data relating to a texture map, the texture map having an associated dimension and being stored at a given location in a single memory device, the apparatus comprising:

A location field identifying the given location in the memory device;

A dimension field identifying the dimension of the texture map (See Fig 1, Fig 7)

Lentz does not specifically disclose that texture packet has data relating to the dimensional type of its texture map. However, in an analogous art (texture mapping), Saunders et al discloses that "the special bind texture call includes a target parameter

that <u>defines the dimension of the texture map</u> and an ID number that identifies the display list texture object." (See col 6 line 56-67) It would have been obvious to one skilled in the art to incorporate the teaching of Saunders et al into the teaching of Lentz, in order to provide efficient way to perform texture mapping process based on dimension type of texture data, as multi-dimensional texture map are used in current computer graphic systems, (also see the suggestions in col 1 line 51 of Lentz "<u>not necessarily two dimensional</u>") it is necessarily required for indicating dimensional type in texture data, because the ordinary skilled in the art would know that different mathematical equations are required for different dimensional type of texture maps, and the three-dimensional texture mapping process will require large capacity processor and much more time to process comparing to one-dimensional texture mapping process, since 3-D texture mapping have more variable to calculate. Therefore, having the texture data, which indicates its dimensional type, is also advantageously desirable in the teaching of Lentz for operating texture mapping process efficiently with easy manner.

Regarding claim 36, Lentz discloses that the texture map comprises a set of mipmaps, further wherein the location field includes a plurality of subfields, each subfield identifying the location of one mipmap in the set of mipmaps. (See Fig 1, Fig 2, Fig 7, col 1 line 66-col 2 line 4, col 2 line 43-60, col 3 line 10-14, col 3 line 22-36, col 4 line 14-17, col 4 line 42-54, col 5 line 7-11, col 5 line 22-23, col 8 line 46+)

Regarding claim 37, Lentz discloses that the texture map spans a plurality of addresses in the memory device, the location field identifying the plurality of addresses. (See Fig 1, Fig 7)

Regarding claim 38, Lentz discloses that the data structure is stored in the memory device, the memory device being texture memory. (See Fig 1)

Claims 14, 20 and 26-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lentz, young and Tanaka et al in view of Saunders et al, and further in view of Chimoto (5,550,961).

Regarding claim 14, Lentz fails to explicitly disclose that the texture map being reconstructed based upon the determined dimensional type of the texture map. However, Chimoto discloses that reconstructing the two-dimensional texture data as one-dimensional texture data. (See Fig 3, col 2 line 50-55, col 5 line 12-39, col 6 line 67-col 7 line 39, col 7 line 55+) It would have been obvious to one skilled in the art to incorporate the teaching of Chimoto into the teaching of Lentz, in order to operate high-speed texturing without extensive using of texture memory (See col 2 line 16-21, col 5

line 16-25 in Chimoto), as such improvement is also advantageously desirable in the teaching of Lentz by both hardware and software optimization.

Regarding claim 20, claim 20 is similar in scope to the claim 14, and thus the rejection to claim 14 hereinabove is also applicable to claim 20.

Regarding claim 26, Lentz discloses that the claimed feature of a method of storing a texture map in linear texture memory of a graphics accelerator, the method comprising:

a) determining the dimension of the texture map; b) converting the texture map to a one dimensional texture map if the dimension of the texture map is determined to be more than one dimensional, the one dimensional texture map having a first number of consecutive data blocks; c) locating a second number of consecutive memory locations in the texture memory, the first number being equal to the second number; d) storing the one dimensional texture map in the located memory locations in the texture memory. (See Fig 1, Fig 7, col 1 line 66-col 2 line 4, col 2 line 43-60, col 3 line 10-14, col 3 line 22-36, col 4 line 14-17, col 4 line 42-54, col 5 line 7-11, col 5 line 22-23, col 8 line 46+)

Lentz does not specifically disclose that texture packet has data relating to the dimensional type of its texture map. However, in an analogous art (texture mapping), Saunders et al discloses that "the special bind texture call includes a target parameter that <u>defines the dimension of the texture map</u> and an ID number that identifies the

display list texture object." (See col 6 line 56-67) It would have been obvious to one skilled in the art to incorporate the teaching of Saunders et al into the teaching of Lentz, in order to provide efficient way to perform texture mapping process based on dimension type of texture data, as multi-dimensional texture map are used in current computer graphic systems, (also see the suggestions in col 1 line 51 of Lentz "not necessarily two dimensional") it is necessarily required for indicating dimensional type in texture data, because the ordinary skilled in the art would know that different mathematical equations are required for different dimensional type of texture maps, and the three-dimensional texture mapping process will require large capacity processor and much more time to process comparing to one-dimensional texture mapping process, since 3-D texture mapping have more variable to calculate. Therefore, having the texture data, which indicates its dimensional type, is also advantageously desirable in the teaching of Lentz for operating texture mapping process efficiently with easy manner.

Also, the combination of Lentz, Tanaka, Saunders et al do not explicitly disclose that converting the multi-dimensional texture map into a one dimensional texture map. However, Chimoto discloses that the way of express the two-dimensional texture data as one-dimensional texture data. (See Fig 3, col 2 line 50-55, col 5 line 12-39, col 6 line 67-col 7 line 39, col 7 line 55+) It would have been obvious to one skilled in the art to incorporate the teaching of Chimoto into the teaching of Lentz, in order to operate high-speed texturing without extensive using of texture memory (See col 2 line 16-21, col 5

line 16-25 in Chimoto), as such improvement is also advantageously desirable in the teaching of Lentz by both hardware and software optimization.

Regarding claim 27, refer to the discussion for the claim 26 hereinabove, Chimoto discloses that step b) comprising:

B1) defining a plurality of data blocks within the texture map (See Fig 3, col 2 line 50-55, col 5 line 12-39, col 6 line 67-col 7 line 39, col 7 line 55+)

B2) assigning a sequence number to each of the data blocks, the sequence numbers being consecutive numbers. (See Fig 3, col 2 line 50-55, col 5 line 12-39, col 6 line 67-col 7 line 39, col 7 line 55+)

Regarding claim 28, refer to the discussion for the claim 26 hereinabove, Chimoto discloses that step d) comprising:

D1) consecutively storing each consecutive data block of the one dimensional texture map in the located memory locations. (See Fig 3, col 2 line 50-55, col 5 line 12-39, col 6 line 67-col 7 line 39, col 7 line 55+)

Regarding claims 29-31, claims 29-31 are similar in scope to the claims 26-28, and thus the rejections to claims 26-28 hereinabove are also applicable to claims 29-31.

Regarding claims 32-34, claims 32-34 are similar in scope to the claims 26-28, and thus the rejections to claims 26-28 hereinabove are also applicable to claims 32-34.

Response to Arguments/Amendments

Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Specifically, in response to Applicant's arguments ("a single texture buffer and a plurality of texture processors, wherein the plurality of processors retrieve texture packets from the single texture buffer" is not disclosed in the cited reference), which presented during the telephone interview on May 22, 2003 and page 2 of the amendment filed on Feb 6, 2003, Examiner made the new ground of rejection based on the fact that it would have been obvious to one skilled in the art to employ plurality of texture processors with the single texture buffer, thereby reducing texture-processing time effectively. (See Fig 4, col 3 line 31-39, col 3 line 51-54 in 'background of the invention' of Kobayashi et al (U.S 5,761,401)) ["to enable all parallel processing units to access a single texture buffer because texture mapping is applying by the parallel processing units"]; (Also See the rejection hereinabove)

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Chung whose

telephone number is (703) 306-3419. He can normally be reached Monday-Thursday and alternate Fridays from 7:30am- 5:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael, Razavi, can be reached at (703) 305-4713.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Jeffery A. Brier

djc
September 2, 2003

JEFFERY BRIER
PRIMARY EXAMINER